

- 13 (7) Vertex not advanced in front of the eyes; median carina of pronotum scarcely elevated.
- 14 (15) Body usually broad between the shoulders; vertex narrower or equally wide with one of the eyes; second femoral carinae more or less flexuous, or undulate, or lobate, or clypeate, very rarely straight.  
Gen. *Paratettix* Bol.
- 15 (14) Vertex strongly narrowed in front, the front border nearly one-half the breadth of an eye, or less; body usually proloungate; branches of frontal costa sub-parallel, closely approximate.  
Gen. *Telmatettix* gen. n.
- 16 (3) Anterior femora above distinctly and broadly sulcate; pronotum in front produced more or less above the head, very frequently hooked, acuminate, or, to a certain extent, obtusely rounded angulate; antennae sixteen to twenty-two articles.  
Subfamily BATRACHIDINAE Bol.
- 17 (18) Body strongly tumid; dorsum of the pronotum convex, lightly punctate, lateral carinae in front of the shoulders wanting.  
Gen. *Paxilla* Bol.
- 18 (17) Body narrower; dorsum of the pronotum, between the carina rather concave, conspersed with more or less longitudinal wrinkles, lateral carinae in front of the shoulders present.  
Gen. *Tettigidica* Scudd.

## THE "COCOONS" OR "CASES" OF SOME BURROWING CATERPILLARS.

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From much watching of pupating caterpillars, especially of such sphingids and ceratocampids as go into the ground to pupate, I gradually came to doubt the exactness of the statements, made in many books, that such caterpillars spin "cases" or "cocoons" in the earth inside of which they transform.

Last summer I had a good supply of *Protoparce celeus* and *carolina*, *Philampelus pandorus* and *achemon*, *Ceratonia amyntor*, and *Paonias excoecatus*, with which I experimented.

Into tin boxes I put sifted earth deep

enough to give ample room for cases. Into each box I put a larva ready to pupate, and wandering in search of a suitable place. All burrowed very soon, and I left the boxes undisturbed for a few days, that no unusual condition should affect the larvae.

On examining the boxes, which was very carefully done, I found, in every case, no sign of silk, and no "case" which held together at all. I found an oval cavity, smooth, and large enough to hold the pupa easily, allowing free motion of the abdominal segments and

even space to turn over completely. The walls of the cavity seemed pressed by the turning of the caterpillar and moistened by the sticky fluid which exudes from such larvae in the early stages of pupation. This combined fluid and pressure served to keep the earth from falling upon the caterpillar under ordinary circumstances, but a very slight touch with pencil, fingers, or stem sent the upper walls down as dirt, not as fragments of a case or of a wall.

I then put less earth in a tin and put on it a caterpillar which was ready to burrow, and watched it.

Butting its head against the earth it made a small hole, then worked the hole larger until it would admit the entire body, which the earth was not deep enough to cover.

The caterpillar then moved about in this hole, butting the sides with its head until there was room to spare, and the walls were packed by the pressure. Exudation had begun and the fluid was forced against the walls by the crawling and butting of the caterpillar, so that all was absorbed by the earth.

There was no spinning whatever, nor any of the weaving motion of the head made by the caterpillar when spinning. At first the caterpillar lay on its venter, shortened and moist. After a day or two it turned upon one side, curled slightly in a curve. Next it turned on the other side, then on its back, still slightly curled. Then the ends of the skin began to look empty, and the caterpillar slowly rolled over

upon the venter, and soon cast the larva skin. I repeated this experiment several times, and with different species, and always with the same result.

*Dryocampa rubicunda* gave the same results also, though much less fluid exudes from these.

I satisfied myself that with these species the cell formed for pupation could not be called either a case or a cocoon, since it could not be taken up as a whole without taking up enough of the surrounding earth to keep from it all pressure and jar, as these destroy it at once.

I tried the same plan with *Deilephila lineata*, which in my former experiences has always spun a slight cocoon, like a fish-net, between leaves.

The four specimens I put into the four tins with earth, shaped cells for themselves, and did not spin at all. They did not burrow as deep as the other larvae however.

The boxes were kept tightly covered except when I was watching the caterpillars, so that the earth was not dried too much.

The pupae were all perfect, but no better, except those of the *Protoparce* and *C. amyntor*, than those made by the other larvae pupating in tins without earth.

In making their cells the caterpillars did not bring earth to the surface, but merely pushed it back on all sides, so that in the tins with deeper earth there was no trace of any burrow or caterpillar.